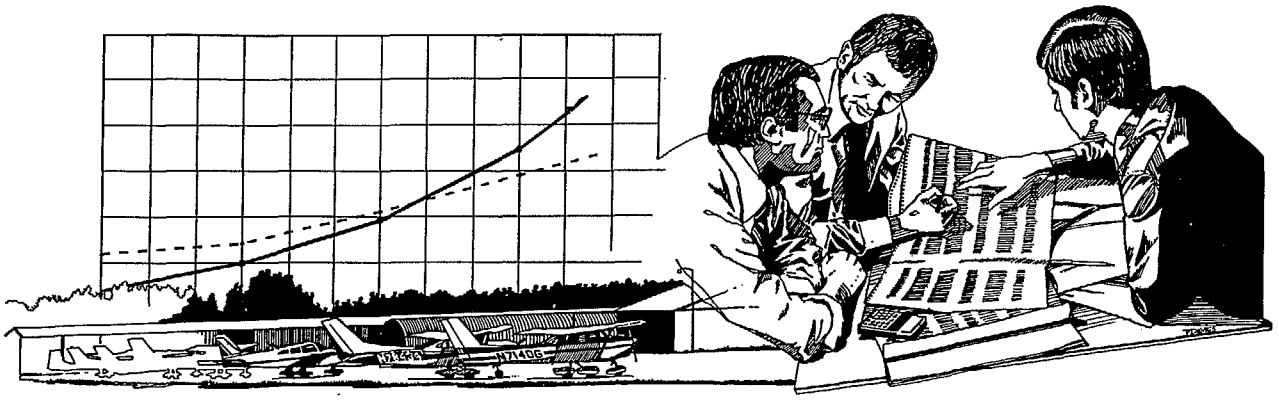
Chapter Three
AVIATION DEMAND FORECASTS



Chapter Three
AVIATION DEMAND FORECASTS

The proper planning of a facility of any type must begin with a definition of the needs that the facility can reasonably be expected to serve over the specified planning period. At Show Low Municipal Airport, this involves the development of a set of forecasts that best define the potential of future aviation demand. Forecasts of general aviation, and military activity at the airport can be used as a basis for determining the types and sizes of aviation facilities required to meet the aviation needs of the White Mountain Region through the year 2010.

Forecasts are applied to several phases of the study. Initially, they are used to analyze the capacity of the airfield, and the terminal area. They are also used to evaluate the airport's role in the regional airport system, which may affect the need for improved navigational systems. Later in the study, they will be used in the financial analysis and alternative development actions. Finally, the aviation forecasts are used to develop measures of aircraft noise and assess air quality impacts.

The primary objective of a forecasting effort is to define the magnitude of change that can be expected over time. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty aviation activity on a year-to-year basis over an extended period of time. However, a growth curve can be established to predict the long-term growth potential.

While a single line is often used to express the anticipated growth, it is important to remember that actual growth may fluctuate above and below this line. For this reason, graphical depictions of aviation forecasts in this chapter will include a forecast envelope, serving as a reminder that actual growth in activity seldom follows a simple straight line or mathematical curve. The primary point to remember about forecasts is that they serve only as guidelines, and planning must remain flexible to respond to unforeseen events.

Aviation activity at an airport is affected by many external influences, as well as by the

facilities and services available. Few industries have seen as dynamic a change as the aviation industry since the first powered flight. Major technological advancements as well as regulatory and economic actions have resulted in erratic growth patterns which have had significant impacts upon aviation activity. More recently, regulatory and economic actions have created very significant impacts upon activity patterns at most airports. The following sections attempt to define the historical trends and discuss how other influences may affect future trends in establishing forecasts of aviation activity for Show Low Municipal Airport.

FORECAST PROCEDURES

The systematic development of aviation forecasts involves both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience and knowledge of the situation, is important in the final subjective determination of the preferred forecast.

The analysis begins with the assessment of historical trends as data is collected and sorted on a variety of aviation indicators at the local, regional, and national level. Aviation related factors such as aircraft operations, and based and registered aircraft were obtained for analyses. Similarly, socioeconomic factors such as population, income, and employment are also analyzed for the effect they have had on aviation activity. The identification and comparison of the relationships between these various indicators provides the initial step in the development of realistic forecasts of aviation demand.

As part of the analytical process, trend lines based upon historic relationships are extended into the future based upon these techniques and assumptions. Trend lines developed through the use of a variety of techniques are called projections. After preparing several such projections, the analyst is able to identify a range of growth within which the true trend will probably lie.

FORECAST METHODOLOGY

The most reliable approach to estimating future aviation demand is the use of several analytical models, then comparing the results. The most common techniques used include; correlation analysis, regression analysis, time-series extrapolation, and market-share analysis.

Correlation analysis examines the direct relationship between two or more sets of historical data. Used primarily as a statistical test on a multiplicity of variables, this analysis will detect significant correlations between sets of variables. These sets can then be evaluated further using several types of regression analysis.

In regression analysis, projections of an aviation demand element (dependent variable) are prepared based upon its relationship to one or more aviation indicators, known as the independent variables. Enplaned passengers and based aircraft are examples of dependent variables, while population, per capita income, gross national product, and other socioeconomic factors are examples of independent variables. Linear, curvilinear, and multiple regression analyses all can be tested to attempt to define the best relationship from which future activity can be projected.

Time-series, least squares extrapolation is probably the simplest, most widely used method of forecasting. This technique involves the fit of historical growth trends to future years. In utilizing this technique, an assumption is made that the same factors will continue to affect future demand in approximately the same way. While this can

be a rather broad assumption, it does provide a reliable benchmark from which to compare the results of other analyses.

The market-share technique involves a review of the airport's activity in terms of a larger aviation market. The local share-of-the-market factor is then multiplied by forecasts of the larger total market for a projection of the local activity. This top-down approach usually proves quite accurate and is also useful as a check on the reasonableness of other analytical techniques.

Using a broad spectrum of local, regional, and national socioeconomic information, surveys and aviation trends, forecasts are developed in the following sections for several key aviation activity categories, including:

- General Aviation Based Aircraft and Operations, and Military Activity.
- Peaking Characteristics and Aircraft Mix.
- Annual Instrument Approaches.

At this point, the second phase comes into play. The analyst must study the various growth elements and utilizing experience and professional judgment, weigh several other intangible factors before finalizing a forecast. These factors include:

- Uses for which the forecast is being developed.
- Character of the community.
- Potential changes in the general business climate.
- State-of-the-art advances in technology.
- Impact of new facilities or improved services.
- Policies of the airport owner and operator.

Two important considerations bear upon the finalization of forecasts for planning purposes. First, one cannot assume a high level of confidence in forecasts that extend beyond five years. However, more than five years is often needed to complete even a simple facilities development program, and at least twenty years is necessary to assure the proper return on the investment. The second consideration is the level of optimism reflected in the forecasts. The planning effort must design in sufficient flexibility so that the Master Plan will be relatively insensitive to minor fluctuations in the forecasts.

TRENDS AT THE NATIONAL LEVEL

Each year, the FAA publishes its national aviation forecast. Included in these projections are categories for air carriers, air taxi/commuters, general aviation, and the military. The forecasts are prepared to meet budget and planning needs of the various units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and by the general public. These projections are macro oriented and indicate trend at the national and regional level.

The current edition of this annual forecast is **FAA Aviation Forecasts-Fiscal Years 1988-1999.** Generally the assumptions under which the forecasts were developed are; strong economic growth is anticipated through the forecast period, real fuel prices are expected to rise, and moderate inflation is anticipated. The net result of these factors is a forecast that projects aviation activity growing at about the same rate as the general economy.

FAA aviation forecasts for the period 1988-1999 were developed utilizing projections of key economic variables provided by the Executive Office of the President, Office of Management and Budget. For the period 1994-1999, FAA aviation forecasts were based on consensus growth rates of key economic variables provided by Data Resources, Inc.; Evans Economics, Inc.; and Wharton Econometric Forecasting Associates. These projections are combined with projections of aviation variables and professional judgment

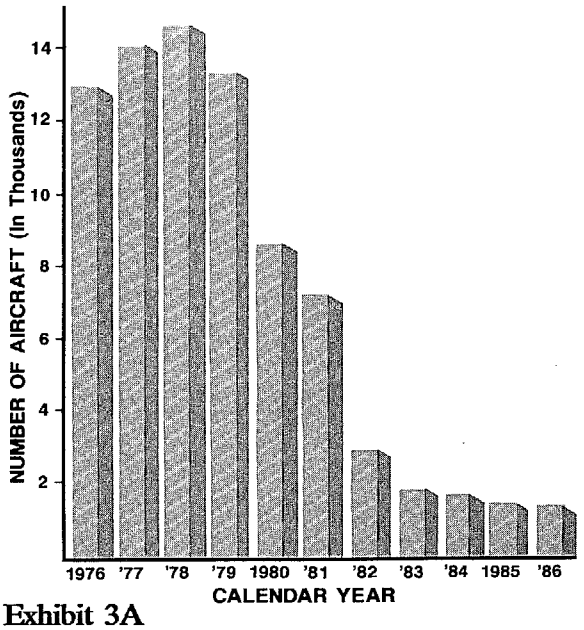


Exhibit 3A
SINGLE ENGINE PISTON AIRCRAFT SHIPMENT 1976-1986

on the probabilities and consequences of vents that affect aviation. The combination is used as input to the econometric models from which the forecasts are generated.

Several conclusions have been drawn based on the background data and forecasts. The forecasts developed by these models indicate a continuation of strong growth for commercial operations. Due to a nine year slump in the general aviation manufacturing industry and expected low levels of production for the next few years, the forecasts for this segment of the industry have been significantly lowered. However, multi-engine piston and turbine powered aircraft shipments showed improvements over totals for fiscal year 1986. Increased community resistance to airports is identified as having an uncertain impact upon the construction of new runways and major new airports. In order for the national forecasts to be realized, restrictions on capacity and system growth must be dealt with at an early date. The national forecasts assume that these threats to orderly growth are manageable and that there would be only minor fluctuations to the long-term growth expected for the industry.

The general aviation industry is undergoing deep and broad structural changes. These changes indicate that the long-term growth of the active fleet and activity will be slower. Over the past nine years, general aviation shipments have continuously declined from a peak of 17,811 units in 1978 to 1,495 in 1986, as reflected in **Exhibit 3A.**

The major independent manufacturers have been taken over by conglomerates, and Cessna and Piper have suspended production of most of their piston engine aircraft. For the foreseeable future, the large general aviation manufacturers will focus on the production of turbine powered aircraft. Ultimately, a declining number of pilots, combined with the slowdown in the expansion of the fleet will reduce the rate of growth of activity at FAA facilities.

Many experts had felt that general aviation would eventually respond to the current economic recovery, but it has not. Historically, the economic cycle of the general aviation industry closely paralleled that of the national economy. Theories abound as to why the continuing decline in aircraft sales and active pilots has not responded to recent economic growth. Some cite high aircraft costs, which have continued to increase even during periods of relatively modest inflation, as reflected in **Exhibit 3B.** Others cite high operating costs and interest rates, changes in the tax code, and high product liability costs. There are those who believe the overvalued dollar severely depressed the export market. Some combination of these factors is surely responsible, and their negative impact has outweighed the positive effects of a growing economy.

On the positive side, use of general aviation aircraft by business has increased. As a result, the characteristics of the general aviation fleet continues to change. The more expensive and sophisticated turbine powered

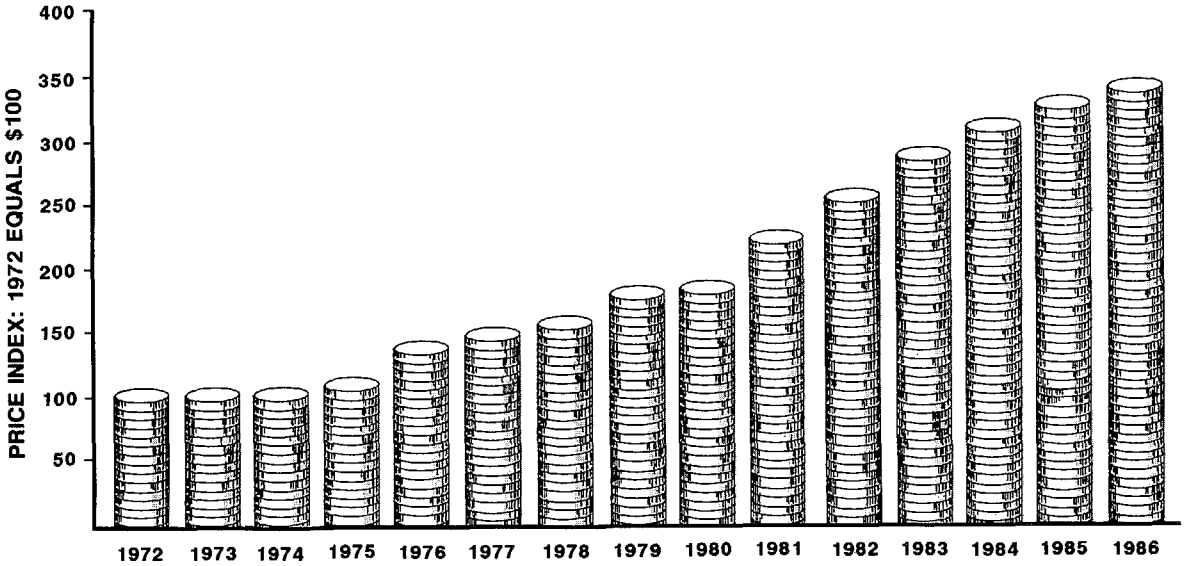


Exhibit 3B
SINGLE-ENGINE PISTON AIRCRAFT
PRICES 1972-1986

component of the fixed wing fleet is expected to grow much faster than piston aircraft between 1988 and 1999. A total of 10,500 turbine powered aircraft were in the fixed wing general aviation fleet in 1987, representing approximately 5.4 percent of the total fixed wing fleet. By 1999, it is estimated that roughly 7.8 percent of the total fixed wing fleet will be comprised of turbine powered aircraft.

Using a forecast model which accounts for many of the preceding factors, the FAA has developed national projections for general aviation. The active general aviation fleet is projected to decline by 0.2 percent through 1992, and then grow by 0.2 percent for the remainder of the forecast period. Active single engine piston aircraft are projected to decline at an annual rate of 0.4 percent, falling from 171,800 in 1987 to 162,500 in 1999. The number of multi-engine piston aircraft is expected to decline through 1993, and then to increase to about 100 aircraft per year until the total reaches the present level of 23,900 aircraft. Turbine powered aircraft are projected to increase from 10,500 in 1987 to 15,700 in 1999, growing at an annual rate of approximately 1.2 percent. The forecast of the turbine rotorcraft fleet shows a yearly increase of 1.9 percent.

GENERAL AVIATION DEMAND

General Aviation is defined as that portion of aviation which encompasses all facets of aviation except commercial airline and military operations. To determine the types and sizes of facilities that should be planned to handle general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include the following:

- Based Aircraft
- Aircraft Fleet Mix
- Annual Aircraft Operations
- Peaking Characteristics

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of the other indicators can be projected based upon this growth and other factors characteristic of Show Low Municipal Airport and the White Mountain Region. The rationale behind the general aviation activity forecast is presented below.

BASED AIRCRAFT

The primary indicators of demand at general aviation airports are based aircraft, and aircraft operations. Because activity at an airport will depend largely upon the number of based aircraft, the factors that influence basing potential are examined closely. This data has been examined on state and local levels in the past. Forecasts based upon local conditions will be developed and compared to the projections in previous studies. The local forecasts will examine various economic and demographic factors along with historical trends.

The historical data on based aircraft at Show Low Municipal Airport is somewhat incomplete. Because of this limited data, developing a completely accurate based aircraft trend is not possible. This lack of historical data tends to reduce the accuracy and reliability of any regression analysis between aviation demand factors and other related parameters. Therefore, the trend analysis technique although not disregarded, has limited use. The trends developed will be shown primarily for comparison or support for other projections. Table 3A shows the historical data on registered aircraft for the State of Arizona, Navajo County and based aircraft at Show Low Municipal Airport dating back to 1970.

Table 3A
Aircraft Population

Year	State of Arizona [1]	Navajo County [1]	Show Low Airport [2]
1970	2,399	32	NA
1971	2,405	38	NA
1972	3,356	45	20
1973	3,081	58	NA
1974	3,215	65	NA
1975	3,431	81	NA
1976	3,740	92	NA
1977	4,444	79	NA
1978	5,058	101	NA
1979	5,544	120	43
1980	5,832	118	40
1981	5,863	110	NA
1982	5,874	110	49
1983	6,025	108	49
1984	6,158	107	NA
1985	6,182	111	73
1986	6,235	105	73
1987	6,272	92	NA
1988	NA	NA	81
1989	NA	NA	75

[1] FAA Census of U.S. Civil Aircraft
[2] FAA Airport Master Record (Form 5010-1)

Normally total Arizona registered aircraft would not exert a significant influence on the number of aircraft based at a single airport, particularly one located in a rural county. The state totals are heavily influenced by Maricopa and Pima county aircraft which comprise approximately 70 percent of the state's total. However, just as the local population is heavily impacted by seasonal residents from these to regions, so to are the demands for aviation facilities and services.

Trends were developed for registered aircraft in the County and also based aircraft at Show Low Municipal Airport. The aircraft registered in Navajo County more than tripled in the 15 year period from 1970 to 1985. More recently however, the 1987 county aircraft population is about the same as it was in 1976. During this more recent period the aircraft population had climbed as high as 120. These are the cyclical peaks and valleys that will occur over short periods. The long term trend however, is for continued growth at approximately 2.5 percent per year. Based on this data Navajo county would be expected to have a registered aircraft population of 225 aircraft.

Due to the gaps in the based aircraft figures for Show Low Municipal Airport, it is not possible to track the peaks and valleys as clearly as on the county level. Therefore, what effects economic cycles or other factors have had on the number of based aircraft at Show Low Airport could not be determined. However, a trend analysis on the available data did produce a high correlation and indicated a strong growth over the period.

The overall long term trend shows that the number of aircraft based at Show Low Municipal Airport has nearly quadrupled since 1972. This data reflects an average annual rate of growth of 3.2 percent and a correlation coefficient of 0.96. If this trend were to continue the based aircraft would reach 153 aircraft by 2010.

It should be noted that the historic data for Show Low is sparse and has seen several reporting procedure changes. The early data may be under reported which would tend to exaggerate the growth. The rapid growth demonstrated in the past can not be expected to continue. A much more moderate growth rate, more consistent with and probably slightly lower than the state growth, should be expected over the planning period.

The Navajo County aircraft registrations were compared to the county population for the period 1970 through 1987. The population growth within Navajo County has been very consistent since 1970. The number of aircraft registrations in the county has also, until recently, grown steadily. A comparison of the county population with the registered aircraft provides a per capita aircraft registration rate. The per capita aircraft registrations have averaged 2.3 aircraft per 1,000 population. Based on the population projections for Navajo County, this would result in 208 registered aircraft by 2010. The Navajo County per capita aircraft rate is significantly above the national average of 1.1 but falls well below the state rate of 3.0 aircraft per 1,000 population.

The current per capita aircraft registration for Navajo County is 1.2 aircraft per 1,000 population and has been on the decline in recent years. This downward trend is typical of today but is expected to begin increasing in just a few years. For planning purposes and use in the market-share analysis to follow, the historical per capita registration rate was used resulting in a projected Navajo County aircraft registration of 208 aircraft by 2010.

Continuous historical data on based aircraft at Show Low Municipal Airport was not available. Therefore, a history of based aircraft at the airport was constructed from various sources. These sources included the present and past Arizona State Aviation System Plans (SASP's) FAA Airport Master Records (Form 5010-1) and various other studies and reports. Where there was conflicting data, an average of the values was used.

Comparing the Navajo County registered aircraft with the aircraft based at Show Low Municipal Airport, a market-share can be determined. Based on the historical data approximately 51 percent of the registered aircraft in Navajo County have been based at Show Low Municipal Airport. This share has ranged from a low of 33 percent to a high of 88 percent. As evidenced by the poor correlation (0.37) this comparison does not accurately reflect the conditions at Show Low Municipal Airport.

According to State of Arizona aircraft registration records there are currently 75 aircraft registered in Navajo County. These same records show that there are 18 aircraft at Show Low Municipal Airport which accounts for approximately 24 percent of the county aircraft. The 18 aircraft reflected in the state records are those whose owners

primary residence is Show Low. These record do not reflect those aircraft whose owners primary residence is in the Phoenix or Tucson area and regularly base their aircraft at Show Low for a Portion of the year.

This market-share of the county analysis yields little in the way of based aircraft projections for Show Low Airport. However, it does indicate the significance of the nonpermanent population on the White Mountain Region. It also illustrates the impact that this segment of the population has on the demand for aviation services and the extent of the airport service area of Show Low Municipal Airport.

Obviously the service area for Show Low Airport extends well beyond the limits of Navajo County. Since the seasonal population plays such a significant role in the demands for aviation services, and, since this seasonal population comes from the two counties that comprise 70 percent of the state aircraft; it is logical that a market-share of the state may be more appropriate to represent conditions at Show Low.

Comparing the registered aircraft in the state to the based aircraft at Show Low provided a much higher correlation of 0.85. Based on this analysis, approximately 1.6 percent of the state aircraft have been based at Show Low. The projections of registered aircraft in the State of Arizona forecast that there will be 13,627 aircraft in the state by 2010. If this share of the market remained constant Show Low Municipal Airport could expect 181 based aircraft by 2010.

The local share of the state market is very small and the market is dominated by Maricopa and Pima counties. As Maricopa and Pima counties continue to grow Show Low's 1.6 percent market-share should continually decrease. Therefore, the projections from the market-share of the state analysis can serve as a high range forecast for based aircraft at Show Low Municipal Airport.

The historical based aircraft figures for Show Low Municipal Airport were compared to two different population bases. The data on Show Low Municipal Airport's based aircraft was first compared to the airport service areas permanent population. This regression analysis resulted in a very high correlation coefficient of 0.98. Based on this data the based aircraft per 1,000 population averaged 4.4. The 4.4 aircraft per 1,000 population compared to 3.0 for the state as a whole, and was considered much to high for this region of the state.

The permanent population of the airport service area was adjusted to include an estimate of the seasonal population. The permanent population was multiplied by a factor of 1.67 and again compared to the based aircraft data. This analysis resulted in an equally high correlation (0.98), however the based aircraft per 1,000 population was reduced to 2.6. This factor compares to a 3.0 aircraft per 1,000 for the state and a 2.3 aircraft per 1,000 for the county.

The need to adjust the service area population to achieve a reasonable per capita aircraft rate again indicates the strong influence exerted on Show Low Airport from sources outside the county.

The two market-share analyses resulted in two extreme projections of based aircraft at Show Low. The projection based on the share of the county was the lowest forecast at 82 aircraft by 2010, while the projection based on a share of the state produced the highest forecast of 181 based aircraft by 2010. Logic would dictate that since Show Low Municipal Airport serves more than Navajo County and attracts a large segment from the metropolitan areas, that a reasonable forecast would lie somewhere in between.

Combine the logical assessment with the various population regressions and it becomes clear that Show Low Municipal Airport should be planned to accommodate at least 134 aircraft by 2010. Table 3B compares the various projections of based aircraft determined from the above analyses. Also included in the table are the projections from the current state airport system plan and the previous airport master plan for Show Low Municipal Airport.

Table 3B

Based Aircraft Projections
Show Low Municipal Airport

	Existing	1990	1995	2000	2005	2010
Navajo County Registered Aircraft	92	135	155	173	192	208
Show Low Municipal Airport						
Historical Trend	75	81	99	117	135	153
Market-Share of County	75	61	67	72	78	82
Service Area Population	75	84	97	107	121	134
Market-Share of State	75	73	102	129	154	181
Planning Forecast	**75**	**84**	**97**	**107**	**121**	**134**
Previous Studies						
Previous Master Plan	44[1]	58	67	80	NA	NA
1985 SANS	34[2]	46	56	66	78	NA
1978 SASP	33[1]	41	49	56	NA	NA
1988 SASP	34[3]	36	41	46	52	60

[1] 1985 Value
[2] 1984 Value
[3] 1988 Value

The selected planning forecast of based aircraft was determined on several of the more significant and tangible factors that will influence the future of Show Low Municipal Airport. This not to say that other factors will not play a role in the future activity at Show Low Airport. These other factors will influence the basing of aircraft, however, these fluctuations should be relatively minor and temporary. **Exhibit 3C** illustrates the preferred forecast in comparison with the projections from the other analyses.

AIRCRAFT FLEET MIX

The aircraft fleet mix expected to utilize the airport is necessary in order to plan the facilities that will best serve not only the level of activity but also the type of activities occurring at the airport. The mix of based aircraft at Show Low Municipal Airport was determined by an inventory of the types of aircraft currently based at the airport. This was compared with the FAA statistical records of existing and forecast general aviation fleet

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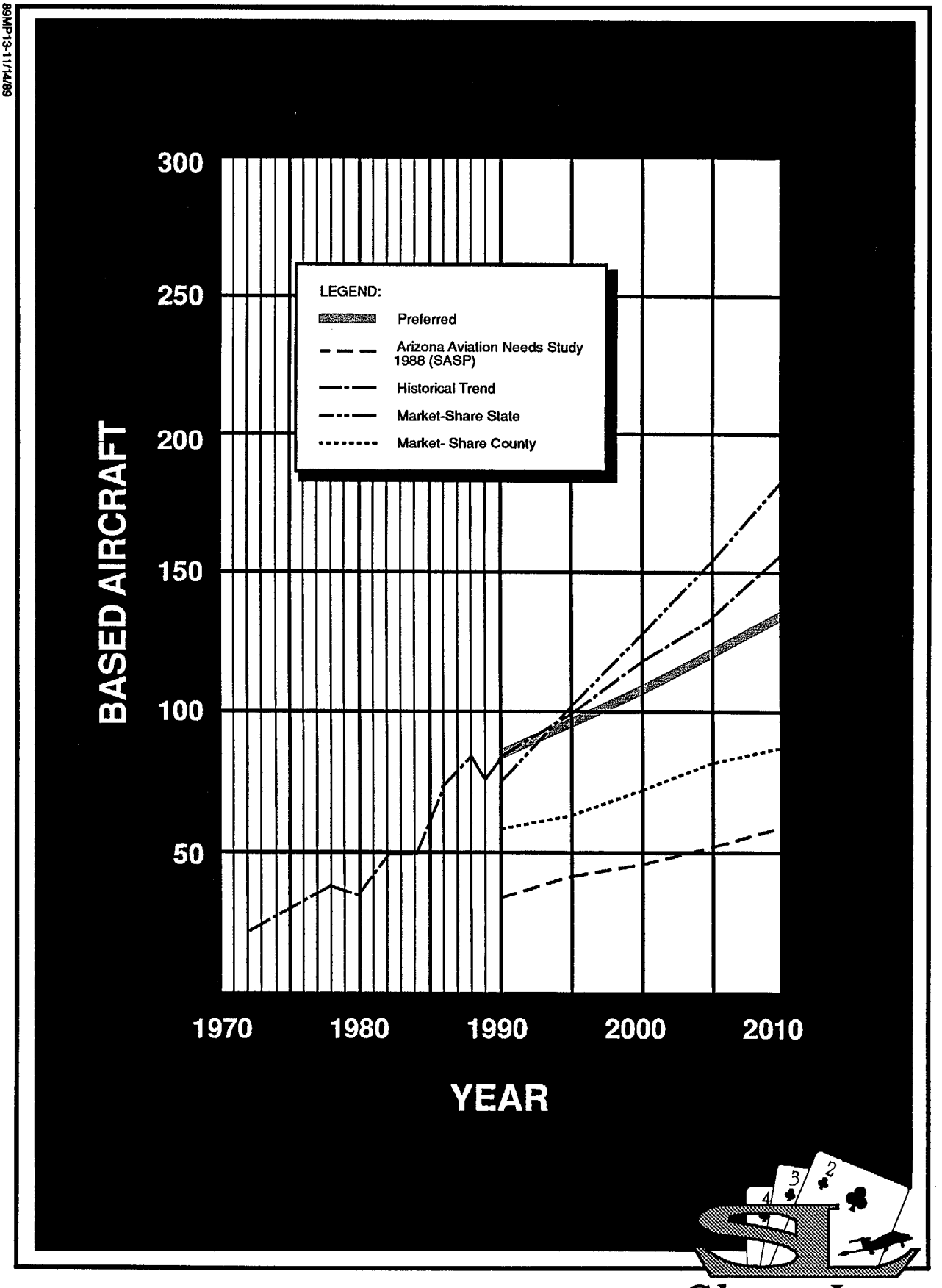

Exhibit 3C
BASED AIRCRAFT FORECASTS

Show Low
MUNICIPAL AIRPORT

mix in order to determine national trends. The national trend forecasts an increasing percentage of more sophisticated and higher performance aircraft in the future.

The local fleet mix and the national fleet mix have not been the same, However, the trends for both have followed similar patterns. That is, both have experienced decreases in the percentage of single engine piston aircraft and increases in the percentage of other aircraft types. These trends were applied to the forecast of based aircraft for Show Low Municipal Airport to determine the forecast fleet mix. The existing and forecast fleet mix is shown in Table 3C.

Table 3C
Based Aircraft Fleet Mix
Show Low Municipal Airport

Type	Existing	1995	2000	2005	2010
Single Engine	70	88	95	104	114
Multi-Engine	4	6	8	9	10
Turboprop	0	1	2	4	5
Turbojet	1	1	1	2	3
Rotorcraft	0	1	1	2	2
TOTAL	75	97	107	121	134

AIRCRAFT OPERATIONS

An airport operation is defined as any takeoff or landing performed by an aircraft. There are two basic types of airport operations: local and itinerant. A local operation is a takeoff or landing performed by an aircraft that will operate within the local traffic pattern within site of the airport, or will execute simulated approaches or touch-and-go operations at the airport. Itinerant operations are all arrivals and departures other than local.

Generally, local operations are characterized as training operations and itinerant operations are those aircraft operating with a specific destination away from the airport. Typically, itinerant operations increase with increases in business or industrial activity since business aircraft are primarily used to carry company employees from one location to another and are flown by professional pilots.

Traditionally, the amount of general aviation activity has had a very high correlation with the number of based aircraft at an airport. Generally, an airport of the size and character of Show Low Municipal Airport can expect activity levels to range from 150 to 400 annual operations per based aircraft. This level of activity is typical of general aviation airports primarily serving a rural area.

The activity records were obtained for Show Low Municipal Airport from the Unicom operation and have been examined to determined historic and current operational levels at the airport. The monthly variation in activity and annual totals are presented in Table 3D.

Table 3D

Operational Activity
Show Low Municipal Airport

Month	1981	1982	1983	1984	1985	1986	1987	1988	1989
January	239	229	372	400	630	892	948	1,272	932
February	309	281	380	403	668	1,080	1,054	1,130	936
March	294	234	389	477	600	1,046	1,060	1,154	1,018
April	379	497	426	392	505	963	1,320	1,466	1,402
May	368	674	648	735	1,129	1,318	1,660	1,632	1,604
June	550	713	746	757	1,302	1,870	1,912	2,074	1,697
July	720	795	722	786	1,256	1,836	2,302	1,988	1,736
August	531	638	774	608	1,220	1,682	1,932	1,716	1,542
September	478	585	588	803	948	1,452	1,952	1,654	1,628
October	367	447	470	513	1,301	1,140	1,808	1,450	1,136
November	344	298	424	499	989	977	1,166	1,108	NA
December	312	354	445	512	1,096	963	1,106	1,133	NA
TOTAL	4,891	5,745	6,384	6,885	11,644	15,219	18,220	17,777	16,357*

*Annualized total based on 10-month figures.

The operations presented in Table 3E represent the recorded data on airport activity. The 1989 data was annualized based on the first ten months of the year. The annual totals were then adjusted upward by ten percent to compensate for the activity that occurs when Unicom is not manned.

The adjusted operations were then compared to the number of based aircraft for that period to establish an operations per based aircraft ratio. Two periods emerged with slightly different values. One for the 1982-1983 time frame where the operations per based aircraft averaged almost 140. The other more recent period from 1986 through 1989 (without 1987) demonstrated an activity level averaging 230 operations per based aircraft.

The earlier period is at the low end of the normally expected activity levels at an airport such as Show Low. The later period is more consistent with industry norms and was felt to more accurately reflect existing conditions at Show Low Municipal Airport. It should further be noted that the increase in the operations per based aircraft factor is also consistent with a growing and developing airport. The comparison of the adjusted annual activity and based aircraft records is illustrated in Table 3E.

Table 3E

Operations Per Based Aircraft
Show Low Municipal Airport

Year	Operations[1]	Based Aircraft	Operations Per Based Aircraft
1982	6,320	49	130
1983	7,020	49	145
1986	16,740	73	230
1988	19,555	81	240
1989	16,350	75	220

[1] Adjusted operations added 10 percent to recorded data.

As can be seen from Table 3E, there is some fluctuation from year to year in the operations from based aircraft figures, however, all the figures are within expected limits. The average of 230 operations per based aircraft for the 1986-1989 period is essentially right on the norm. An increase in the level of operations per based aircraft can be expected as the region and the airport continue to grow.

The annual aircraft operations forecasts for Show Low Municipal Airport has been developed based on existing activity levels and the previous projections of based aircraft. The current operations per based aircraft factor was increased to 300 throughout the planning period. This results in an annual operational demand of 40,200 operations by 2010. **Exhibit 3D** illustrates the projected growth in aircraft activity at Show Low Municipal Airport.

Since there is no tower at the airport, there are no records of local versus itinerant operations. Therefore, comparison to industry norms and local estimates will be used to determine a local/itinerant split of the total airport activity. It is currently estimated that approximately 25 percent of the total operations would be classified as local traffic. This level of local traffic is somewhat below norms but is indicative of the rural environment.

The relatively high level of itinerant traffic would indicate that Show Low Municipal Airport is being utilized more for business and tourism and less for training and recreational use. The level of itinerant traffic is expected to remain high or decrease slightly during the planning period. By 2010, this ratio could decline to approximately 60 percent. The 40/60 local/itinerant split is more normal for a rural general aviation airport.

Table 3F illustrates the projected annual activity levels and the local/itinerant splits that can be expected at Show Low Municipal Airport throughout the planning period.

Table 3F

Annual Aircraft Activity
Show Low Municipal Airport

Year	Total Ops	Local Ops	Itinerant Ops
Existing	18,000	4,500	13,500
1995	24,200	6,750	17,450
2000	28,900	9,500	19,400
2005	34,500	12,700	21,800
2010	40,200	16,000	24,200

MILITARY ACTIVITY

Military operations play a relatively minor role in the air traffic activity at Show Low Municipal Airport. Currently, military operations account for approximately 2.5 percent of total activity. For planning purposes, the military activity has been projected at its current annualized levels of approximately 500 annual operations.

The military activity consists almost exclusively of itinerant operations. Therefore, for planning purposes all the military activity will be classified as itinerant. The forecasts of military activity are presented in the summary of aviation forecasts at the end of this chapter.

PEAKING CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The peak periods that will be used in developing future facility requirements for Show Low Municipal Airport are:

- **Peak Month** - The calendar month when peak aircraft operations occur. This indicator provides an indication of the seasonality of the traffic volumes and a measure of the peak month in relation to an average month.

- **Design Day** - The average day within the peak month. Normally, this indicator is easily derived by dividing the peak month operations by the number of days in the month.

- **Busy Day** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine general aviation ramp space needs.

- **Design Hour** - The peak hour within the design day. Design Hour is used particularly in airfield capacity/delay analysis as well as for terminal building and access requirements.

It is important to note that only the peak month is an absolute peak within a given year. All other peaking factors are relative and could easily be exceeded at various times during the year. However, these factors do represent reasonable planning standards that can be applied without over building or being too restrictive.

At Show Low Municipal Airport, the peak month activity levels have averaged 12.2 percent of annual operations over the past three years. This peak month factor is considerably higher than the standard ten percent. However, this is to be expected given the busy summer time activity in the region. The peak month percentage can be expected to remain relatively constant over the planning period as the seasonal population continues to contribute greatly to the peak summer periods. For planning purposes, the peak month has been projected at an even 12.0 percent of annual operations.

The Design Day, also called the average day of the peak month, will vary from year to year depending on the number of operations during the peak month. However, for planning purposes, it was assumed that the

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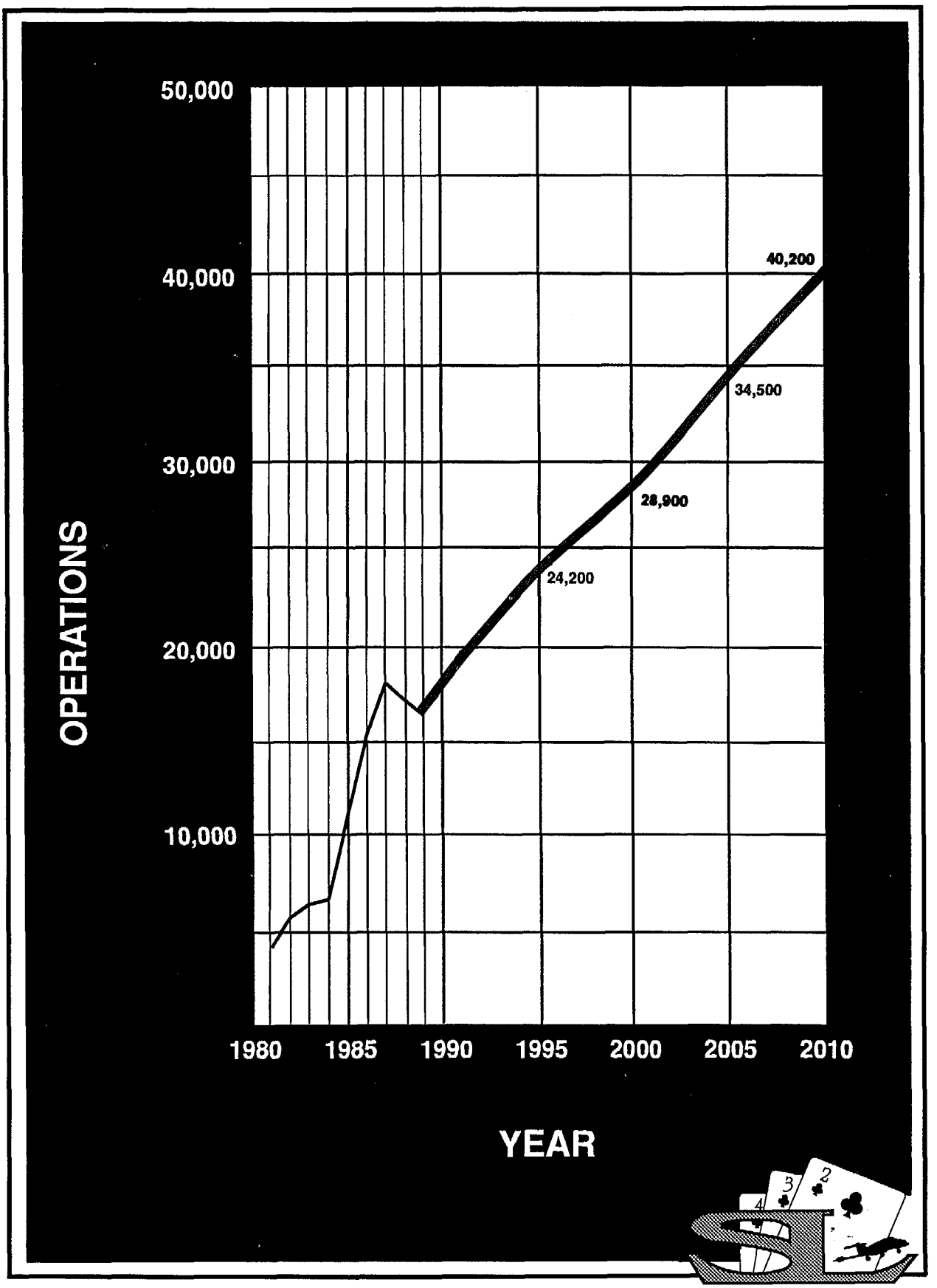

Exhibit 3D
AIRPORT OPERATIONS FORECAST

Show Low
MUNICIPAL AIRPORT

average day of the peak month will be one thirtieth of the peak month activity. This translates to a Design Day factor of 0.40 percent of annual operations.

The Busy Day operations for a general aviation airport typically will run ten to twenty percent greater than an average day. Since all the other activity characteristics are consistent with the norms at general aviation airports, the busy day operations factor has been assumed to be 115 percent of design day activity. This peaking factor has been projected to remain constant throughout the planning period.

Design Hour operations are used to establish the peak hourly demand affecting airfield and terminal facilities. Currently, the Design Hour operations were estimated to be approximately 12.5 percent of the design day operations. This is normal for an active general aviation airport. Design Hour operations will normally range from 10 to 15 percent of average day depending on the total activity. The Design Hour factor will tend to decrease as total activity increases. The Design Hour activity at Show Low Municipal Airport has been projected to remain at its current 12.5 percent level throughout the planning period.

The peaking characteristics were applied to the forecast annual operations to obtain future peak operations at Show Low Municipal Airport. Experience has shown that as activity begins to increase, peak periods will begin to level out. A summary of these four peaking characteristics for the planning period is presented in Table 3G.

Table 3G
Peak Operations
Show Low Municipal Airport

	Existing	1995	2000	2005	2010
Annual Operations	18,000	24,200	28,900	34,500	40,200
Peak Month	2,200	2,900	3,470	4,140	4,820
Design Day	73	97	116	138	161
Busy Day	84	112	133	159	185
Design Hour	9	12	15	17	20

ANNUAL INSTRUMENT APPROACHES

Forecasts of annual instrument approaches provide guidance in determining future navigational aid requirements and eligibility.

An instrument approach as defined by FAA is "an approach to an airport with intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude."

Examination of weather records shows a low occurrence of actual IFR weather conditions in the Show Low area. IFR weather conditions occur approximately 2.0 percent of the time, therefore, actual instrument approaches at Show Low Municipal Airport would comprise 1.0 percent of annual itinerant operations. With this low forecast of IFR activity, the requirement for additional or improved navigational aids and/or instrument approach procedures would be based on factors other than weather, such as capacity or overall safety.

The forecast of actual annual instrument approaches for Show Low Municipal Airport are included in the forecast summary in Table 3H. The forecast of annual instrument approaches will tend to be low since general aviation flying activity is reduced during periods of actual IFR weather conditions.

SUMMARY

This chapter has provided forecasts for those indicators of aviation demand that are essential to the effective analysis of future facility requirements of Show Low Municipal Airport. The next step in the master planning process is to assess the capacity of the existing facilities and to determine the size and quantities of various aviation facilities that will be necessary to meet future aviation demands.

Based upon the projections of aviation demands developed in this chapter, an analysis of existing airport capacity and a determination of future facilities will be examined in the next chapter. Table 3H is provided to summarize the forecast information and for easy reference in later portions of the Master Plan study.

Table 3H
Summary of Aviation Forecasts
Show Low Municipal Airport

	Existing	1995	2000	2005	2010
Annual Operations					
Itinerant					
- General Aviation	13,025	16,950	18,900	21,300	23,700
- Military	475	500	500	500	500
Local					
- General Aviation	4,500	6,750	9,500	12,700	16,000
Total Operations	**18,000**	**24,500**	**28,900**	**34,500**	**40,200**
Based Aircraft					
Single Engine	70	88	95	104	114
Multi-Engine	4	6	8	9	10
Turboprop	0	1	2	4	5
Turbojet	1	1	1	2	3
Rotorcraft	0	1	1	2	2
Total Based Aircraft	**75**	**97**	**107**	**121**	**134**
Annual Instrument Approaches (AIA's)	135	175	194	218	242